

## ABSTRACT OF THE DISCLOSURE

A method of functional brain mapping of a subject is disclosed. The method is effected by (a) illuminating an exposed cortex of a brain or portion thereof of the subject with incident light; (b) acquiring a reflectance spectrum of each picture element of at least a portion of the exposed cortex of the subject; (c) stimulating the brain of the subject; (d) during or after step (c) acquiring at least one additional reflectance spectrum of each picture element of at least the portion of the exposed cortex of the subject; and (e) generating an image highlighting differences among spectra of the exposed cortex acquired in steps (b) and (d), so as to highlight functional brain regions. Algorithms for calculating oxygen saturation and blood volume maps which can be used to practice the method are also disclosed. Systems for practicing the method are also disclosed.